REMARKS

Claim 21 has been amended to recite the subject matter of claim 26, which is canceled herein. Claim 21 has also been amended to recite the transitional phrase "consisting essentially of." Claim 27 has been amended to correct the claim dependency. Claim 29 has been amended to improve antecedent basis. Claim 30 has been amended to delete tri-n-butyl phosphate and mixtures of trioctylamine and tri-n-butyl phosphate. No new matter has been added.

The Office Action mailed November 6, 2006, has been received and reviewed. Claims 1-43 are currently pending in the application, of which claims 21-43 are currently under examination. Claims 1-20 have been withdrawn from consideration as being drawn to a nonelected invention and are canceled herein without prejudice or disclaimer to the filing of one or more divisional applications including the subject matter thereof. Claim 43 is allowed. Applicants note with appreciation the allowance of claim 43. Claims 21-42 stand rejected. Applicants have amended claims 21, 27, 29, and 30, canceled claim 26, and respectfully request reconsideration of the application as amended herein.

35 U.S.C. § 103(a) Obviousness Rejections

Obviousness Rejection Based on Leonard *et al.*, "Development of a Solvent Extraction Process for Cesium Removal from SRS Tank Waste" in view of Wood *et al.*, "Extraction of Lead and Strontium from Hazardous Waste Streams by Solvent Extraction with 4′, 4′, (5′)-di-(t-butyldicyclohexo)-18-crown-6"

Claims 21-42 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Leonard *et al.*, "Development of a Solvent Extraction Process for Cesium Removal from SRS Tank Waste" ("Leonard") in view of Wood *et al.*, "Extraction of Lead and Strontium from hazardous Waste Streams by Solvent Extraction with 4′, 4′, (5′)-di-(t-butyldicyclohexo)-18-crown-6" ("Wood"). Applicants have canceled claim 26, rendering moot the rejection as to this claim. Applicants respectfully traverse this rejection as to the remaining claims, as hereinafter set forth.

M.P.E.P. 706.02(j) sets forth the standard for an obviousness rejection:

> To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or

references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

The obviousness rejection of claims 21-25 and 27-42 is improper because the cited references do not teach or suggest all of the limitations of the claims and do not provide a motivation to combine to produce the claimed invention.

Leonard teaches removing cesium from basic hazardous waste streams using calix[4]arene-bis-(tert-octylbenzo)-crown-6 ("BOBCalixC6"), 1-(1,1,2,2-tetrafluoroethoxy)-3-[4-(tert-octylphenoxy)-2-propanol ("Cs-3"), and Isopar® L. Leonard at p. 745-746. A solvent composition including BOBCalixC6, 1-(2,2,3,3-tetrafluoropropoxy)-3-[4-(sec-butylphenoxy)-2-propanol (referred to as "Cs-7SBT" in Leonard), trioctylamine, and Isopar® L was also produced. *Id.* at p. 758.

Wood teaches removing lead and strontium from acidic hazardous waste streams using a solvent composition that includes 4′, 4′, (5′)-di-(t-butyldicyclohexo)-18-crown-6 ("DtBu18C6"), n-tributyl phosphate ("TBP"), and Isopar® L. Wood at the Abstract.

The cited references do not teach or suggest all of the limitations of claim 21 because the cited references do not teach or suggest the limitation of "contacting the acidic solution with a mixed extractant solvent consisting essentially of calix[4]arene-bis-(tert-octylbenzo)-crown-6 ("BOBCalixC6"), 4′,4′,(5′)-di-(t-butyldicyclo-hexano)-18-crown-6 ("DtBu18C6"), and 1-(2,2,3,3-tetrafluoropropoxy)-3-(4-sec-butylphenoxy)-2-propanol ("Cs-7SB") dissolved in a diluent." Since Leonard teaches a solvent composition that includes BOBCalixC6, Cs-7SBT, trioctylamine, and Isopar® L and Wood teaches a solvent composition that includes DtBu18C6, TBP, and Isopar® L, the cited references do not teach or suggest contacting an acidic solution with a mixed extractant solvent that consists essentially of the components recited in claim 21.

The cited references also do not provide a motivation to combine to produce the claimed invention. To provide a motivation or suggestion to combine, the prior art or the knowledge of a person of ordinary skill in the art must "suggest the desirability of the combination" or provide "an objective reason to combine the teachings of the references." M.P.E.P. § 2143.01. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *Id.* (emphasis in

original).

Applicants respectfully submit that Leonard or Wood, alone or in combination, does not suggest the desirability of, or provide an objective reason for, combination. Specifically, nothing in Leonard suggests the desirability of, or provides an objective reason for, using DtBu18C6 in its solvent composition. Wood also does not suggest the desirability of, or provide an objective reason for using DtBu18C6 in other solvent compositions, such as that of Leonard. As such, Leonard and Wood do not suggest the desirability of, or provide an objective reason for, contacting an acidic solution with a mixed extractant solvent that consists essentially of the components recited in claim 21

The Examiner states that "it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the process described in the Leonard et al. article by including the [DtBu18C6] taught in the abstract of the Wood et al. article into the extraction solvent of the Leonard et al. article because of the expected advantage of extracting strontium." Office Action of November 6, 2006, p. 4. The Examiner further states that "the 'intended purpose' is the extraction of strontium . . . and the 'known material' is the [DtBu18C6]." *Id.* at p. 4-5. However, neither of the cited references suggests the desirability of, or provides an objective reason for, coextracting strontium and cesium. In addition, "[a] prior art reference must be considered in its entirety." M.P.E.P. § 2141.02. The Examiner overlooks the teachings of Wood that DtBu18C6 is used in combination with TBP to remove strontium. Since Wood teaches that the DtBu18C6 and TBP extract strontium, there is no support for the Examiner's position that the "intended purpose" of DtBu18C6 is to extract strontium.

Furthermore, the combination of Leonard and Wood does not produce the claimed invention. Instead, the combination of Leonard and Wood produces a solvent composition that includes BOBCalixC6, Cs-7SBT (referred to as Cs-7SB in claim 21), DtBu18C6, trioctylamine, TBP, and Isopar® L. Since such a solvent composition does not consist essentially of the components recited in claim 21, combining Leonard and Wood does not produce the invention of claim 21.

Applicants also respectfully submit that the claimed invention provides unexpected results. Greater than expected results are evidence of nonobviousness. M.P.E.P. § 716.02(a). "Evidence of unexpected properties may be in the form of a direct or indirect comparison of the claimed invention with the closest prior art which is commensurate in scope with the claims."

M.P.E.P. § 716.02(b). As described in at least paragraphs [0033], [0048], [0049], and [0054]-[0061] of the as-filed specification, an extractant solution that included DtBu18C6, TBP, BOBCalixC6, Cs-7SB, trioctylamine, and Isopar® L did not effectively coextract cesium and strontium. Such an extractant solution is identical to that which would be produced by combining the respective solvent compositions of Leonard and Wood. Rather, the extractant solution that included DtBu18C6, TBP, BOBCalixC6, Cs-7SB, trioctylamine, and Isopar® L resulted in a distribution ratio for cesium of 0.64 and a distribution ratio for strontium of 1.5. In contrast, the extractant solvent of the claimed invention, which consists essentially of BOBCalixC6, DtBu18C6, and Cs-7SB (as recited in claim 21), results in a distribution ratio for cesium of 8 and a distribution ratio for strontium of 10. The latter increased distribution ratios indicate that the extractant solvent as recited in claim 21 provides improved coextraction of cesium and strontium compared to that produced by combining the respective solvent compositions of Leonard and Wood.

Since the cited references do not teach or suggest all of the limitations of claim 21 and do not provide a motivation to combine to produce the claimed invention, the obviousness rejection is improper and should be withdrawn.

Each of claims 22-25 and 27-42 is allowable, *inter alia*, as depending from an allowable base claim.

Claim 25 is further allowable because the cited references do not teach or suggest contacting the acidic solution with the mixed extractant solvent comprising from approximately 0.086 M to approximately 0.108 M DtBu18C6.

Claim 29 is further allowable because the cited references do not teach or suggest contacting the acidic solution with the mixed extractant solvent consisting essentially of approximately 0.15M DtBu18C6, approximately 0.007M BOBCalixC6, and approximately 0.75M Cs-7SB modifier dissolved in an isoparaffinic hydrocarbon diluent.

Claim 30 is further allowable because the cited references do not teach or suggest contacting the acidic solution with the mixed extractant solvent that further comprises trioctylamine.

Claim 32 is further allowable because the cited references do not teach or suggest extracting the cesium and strontium into a first organic phase.

Claim 35 is further allowable because the cited references do not teach or suggest

removing the cesium and strontium at a temperature ranging from approximately 10°C to approximately 15°C.

Claim 36 is further allowable because the cited references do not teach or suggest recovering the mixed extractant solvent, the cesium, and the strontium.

Claim 37 is further allowable because the cited references do not teach or suggest contacting a first organic phase with a second aqueous phase.

Claim 38 is further allowable because the cited references do not teach or suggest extracting the cesium and strontium into the second aqueous phase.

Claim 39 is further allowable because the cited references do not teach or suggest contacting the first organic phase with the second aqueous phase at a temperature ranging from approximately 10°C to approximately 60°C.

Claim 40 is further allowable because the cited references do not teach or suggest contacting the first organic phase with the second aqueous phase at a temperature ranging from approximately 20°C to approximately 40°C.

Claim 41 is further allowable because the cited references do not teach or suggest contacting the first organic phase with an aqueous solution comprising from approximately 0.001M nitric acid to approximately 0.5M nitric acid.

Claim 42 is further allowable because the cited references do not teach or suggest separating a first organic phase and a second aqueous phase.

ENTRY OF AMENDMENTS

The amendments to claims 21, 27, 29, and 30 should be entered by the Examiner because the amendments are supported by the as-filed specification and drawings and do not add new matter to the application.

CONCLUSION

Claims 21-25 and 27-43 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, the Examiner is respectfully invited to contact Applicants' undersigned attorney.

Respectfully submitted,

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